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Controlling a Formidable Adversary: Disease-Transmitting Aedes Mosquitoes

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By Lt. Cmdr. James Dunford, entomologist, Navy and Marine Corps Public Health Center

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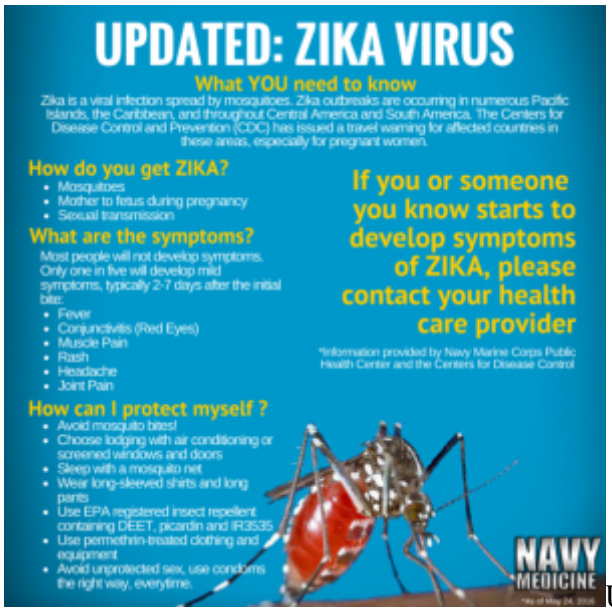
Prevention of mosquito-borne diseases plays an important role in the success of military operations. Re-emerging and emerging infectious diseases such as dengue, chikungunya and Zika virus are becoming increasingly more common in the Western Hemisphere. The primary vectors implicated in the spread of these viruses, *Aedes aegypti* (yellow fever mosquito) and *Aedes albopictus* (Asian tiger mosquito), occur commonly throughout a good portion of the U.S. and their distributions are expanding globally. On top of this, there are more than 100 major military installations in the U.S. within the range of these two *Aedes* species. Service members or travelers returning from regions where these viruses are prevalent increase the chance of local transmission if infected upon their return to the U.S.

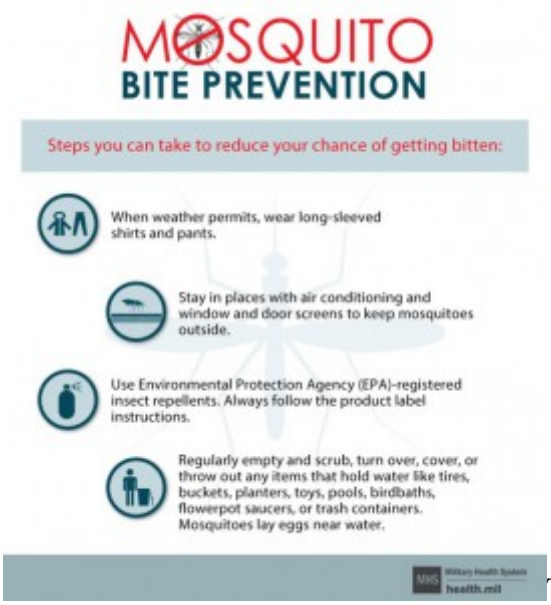


U.S. federal, state and local health agencies have been preparing for potential local transmission of these diseases. For example, the Centers for Disease Control and Prevention has brought together experts and political officials to draft a Zika Action Plan, and the Department of Defense has aligned its prevention strategy with this plan to implement a comprehensive, coordinated approach to reduce the chance of local, sustained transmission. Within the Department of Navy, we've used this plan to organize key intra- and interagency personnel to initiate a response that involves installation commanders, state/local public health officials, emergency management personnel, and vector control specialists, to name a few. We've also been working very hard to distribute information to Sailors, Marines and their families about Zika virus and ways to reduce exposures.

Many homes have screens, doors, and other barriers to prevent mosquitoes from entering and biting, and permethrin-treated uniforms or clothing and several different EPA-approved insect repellents can greatly reduce exposures. To further prevent the spread of these viruses, we also recommend conducting personal or more effective community-wide source reduction campaigns that include eliminating trash and standing water where *Aedes* mosquitoes breed.

Our preventive medicine personnel and state/local mosquito control programs have also increased mosquito surveillance efforts using highly specialized traps. These personnel have been trained to identify mosquito species of concern and determine where and when control activities should be initiated, employing targeted efforts before disease transmission occurs.

While stationed at the Navy Entomology Center of Excellence (NECE), I was able to evaluate a variety of novel and existing control technologies, and NECE personnel continue to work alongside international and domestic vector control specialists to deliver the most effective and economical countermeasures to prevent exposures to disease-transmitting mosquitoes.



The DoD has implemented a specific surveillance plan on its installations for *Aedes* mosquitoes and has issued guidance to have Zika-transmitting mosquitoes tested for the virus. While clinical surveillance for Zika is paramount in tracking the disease, this additional measure may strengthen our ability to detect the virus in the environment should Zika be circulating locally. This surveillance method has been used to track West Nile virus for some time, but it is not clear how effective it will be for diseases such as dengue, chikungunya, or Zika. To that end, my colleagues and I have initiated mosquito pathogen research in the Caribbean to uncover the role mosquitoes play in transmission. Funded by the Armed Forces Health Surveillance Branch, Global Emerging Infections Surveillance and Response System, we will investigate vector capacity and competence in order to better understand the transmission ecologies of dengue, chikungunya and Zika viruses in this part of the world.

For more information on the diseases transmitted by *Aedes* mosquitoes, visit the Navy and Marine Corps Public Health Center's Chikungunya and Zika pages.

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